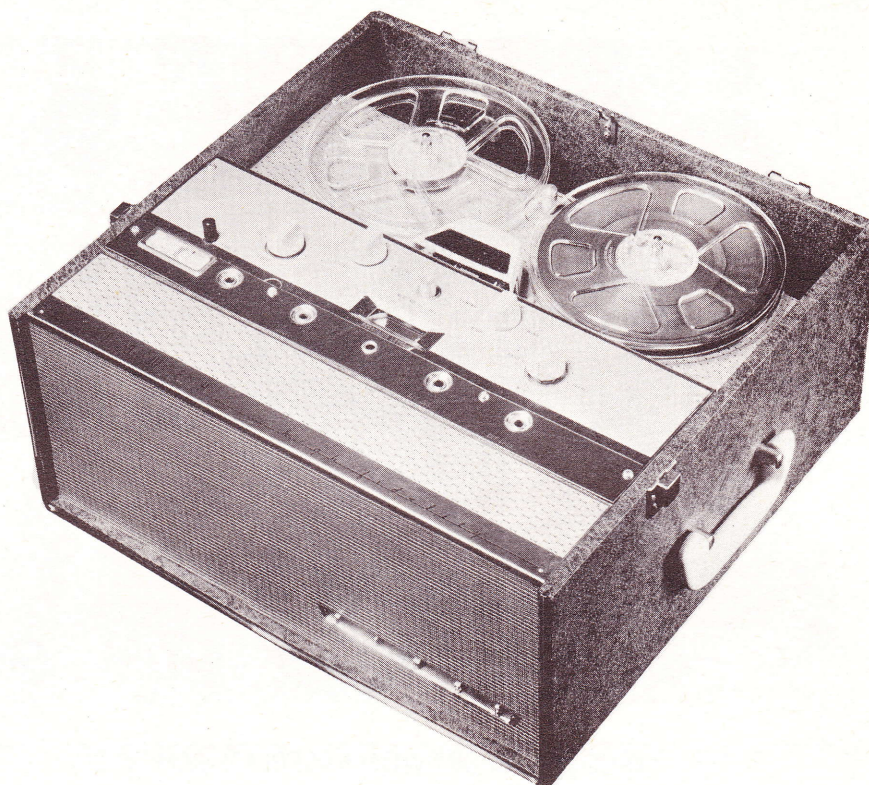


TOWER  
MODEL 4691TOWER  
MODEL 4691

## GENERAL INFORMATION

Tower Model 4691 tape recorders record and play back two tracks of material on standard-width recording tape, thus doubling recording and playback time.

The Model 4691 has an illuminated meter-type volume level indicator, and markings on the meter show the proper volume level for recording. The meter light indicates the unit is on.

Tape speeds are  $3 \frac{3}{4}$  and  $7 \frac{1}{2}$  ips. Using both tape tracks, recording time is as follows:

Reel Size	$3 \frac{3}{4}$ " Speed	$7 \frac{1}{2}$ " Speed
5" (600 ft.)	1 hour	$\frac{1}{2}$ hour
7" (1200 ft.)	2 hours	1 hour

Connect this recorder to an outlet supplying 110-120 volts, 60 cycles AC only.

Supplied by :

Sears, Roebuck and Company  
925 South Homan Ave.  
Chicago 7, Illinois

*This material compiled and published by*

**HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA**  
C357

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DATE 9-58

SET 414

FOLDER 8



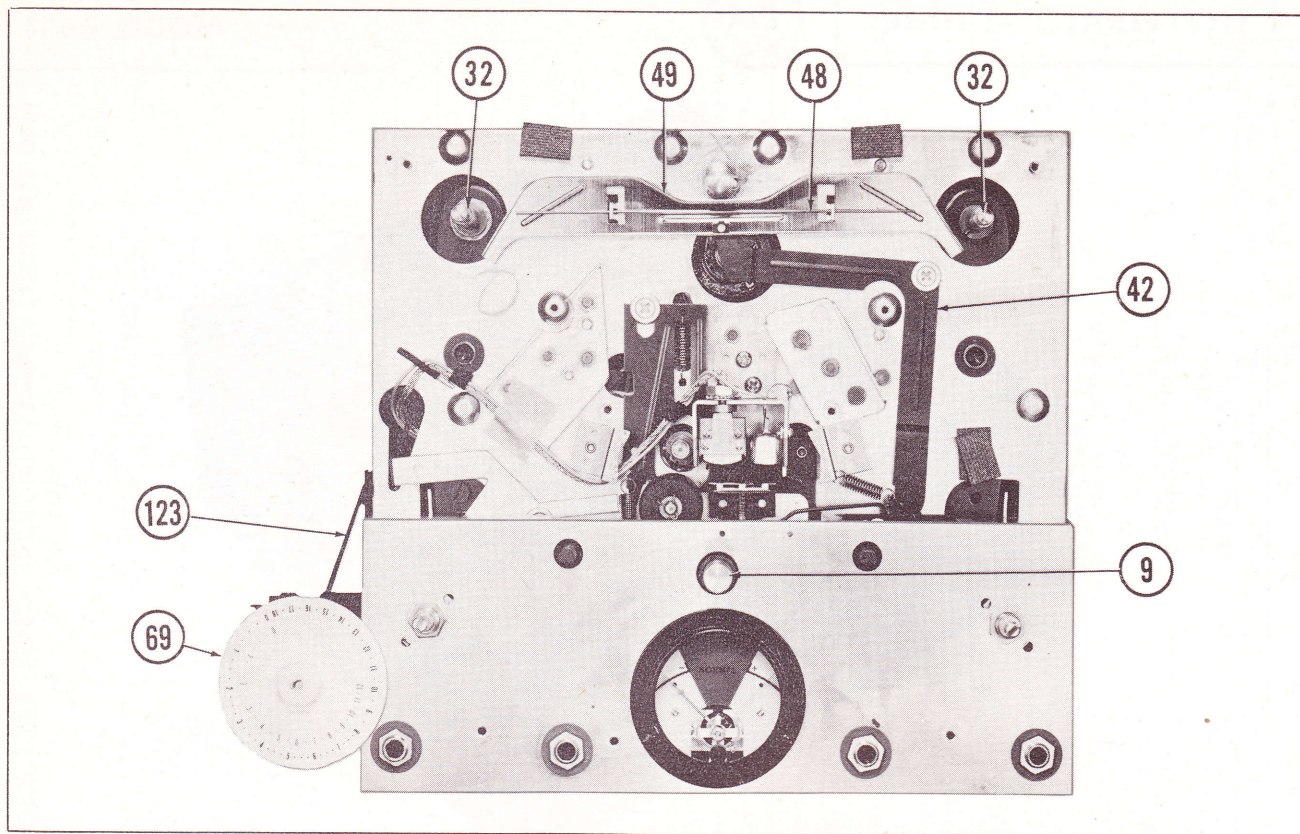


Fig. 1 TAPE TRANSPORT WITH BASEPLATE REMOVED

## PREPARING RECORDER FOR OPERATION

1. Remove power cord, microphone, empty reel, and reel of tape from storage space at rear of set.
2. Plug power cord into any AC outlet having proper frequency and power.
3. Before operating, the operator should familiarize himself with the controls.

## FUNCTION OF CONTROLS

### On-Off-Loudness Control

Left-hand knob on recorder control panel energizes the amplifier and controls volume on record and playback.

### Tape Drive Control

This control operates the tape drive mechanism for record and playback. It has two positions: Idle (left or counterclockwise) and Playback (right or clockwise).

### Record-Edit Control

This control is used with the tape drive control. With Record-Edit control in up (normal) position, amplifier circuit is set for playback. With Record-Edit control held down and Tape Drive control turned to right, Record-Edit control is locked in down position, and recorder will record.

### Fast Forward-Rewind Control

With Tape Drive control in Idle position, turning Forward-Rewind control to right (clockwise) rapidly winds tape on take-up reel. Moving to left (counterclockwise) rapidly rewinds tape on feed reel.

### Tone-Monitor Control and Motor Switch

When Amplifier is on, the motor is turned on and off by this control. It acts as a monitor control as well as regulating tone during playback.

With this control turned off, tape mechanism may be engaged and Loudness control set while tape remains stationary.

### Speed Control

To change speed, place speed button Up for  $3 \frac{3}{4}$  ips and Down for  $7 \frac{1}{2}$  ips.

**CAUTION:** Do not operate speed control unless motor is running.

### Threading Tape

1. Place full reel of tape on right reel plate and an empty reel on left reel plate. Reel slots must engage pins on reel plates.
2. Unwind about 10" of tape. Pull a section of tape taut with both hands and insert in tape slot. Make sure dull-coated side faces rear of recorder.



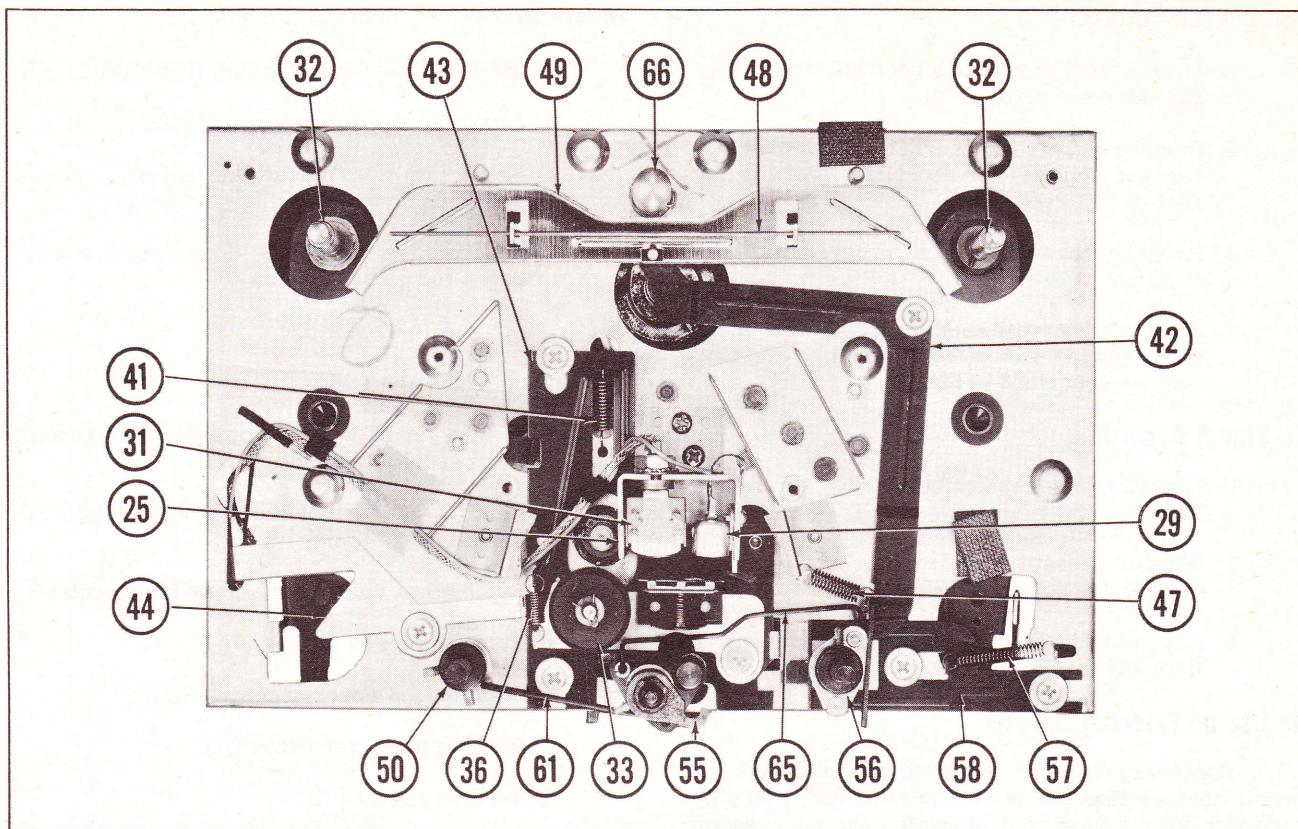


Fig. 2 TAPE TRANSPORT WITH AMPLIFIER REMOVED

3. Insert free end of tape into one of three radial slots in hub of empty reel. Turn reel several turns clockwise until tape is secured and all slack is taken up between reels.

### To Record from Microphone

1. Turn On-Off-Loudness control on.
2. Insert microphone plug into Mike jack.
3. Make sure Tone-Monitor and Motor Switch is off. Depress Record-Edit control and turn Tape Drive control to right until both controls lock in place.
4. Speak into microphone in a normal voice and turn Loudness control to right until pointer on Recording Level Meter fluctuates within Normal range only.
5. Turn on Tone-Monitor and Motor switch and adjust Tone-Monitor control to proper level. Adjust Speed control for desired speed, 3 3/4 or 7 1/2 ips.

**NOTE:** Correct recording volume is important. A signal that is too weak and does not cause record level to fluctuate will result in weak playback and high background noise. A signal that is too strong, causing the level indicator to go above the Normal range, will result in distortion.

### To Record from Radio or TV Receiver

Recordings from a radio or TV Receiver may be made by one of three methods:

1. Place microphone about 6" to 12" in front of receiver speaker. Turn receiver volume control to a normal level and tone control to maximum treble. Set recording level and proceed with recording as described under "To Record from Microphone."

2. Use speaker cable made with a two-conductor phone plug on one end and two alligator clips on the other end. Connect alligator clips across voice-coil terminals on receiver speaker and insert cord plug into Radio jack. Set receiver volume and tone controls as described in Step 1. Set recording level and proceed as described under "To Record from Microphone."

3. Use a shielded cable with a two-conductor phone plug on one end and with the other end connected across receiver volume control. Insert phone plug into Radio jack. Set recording level and proceed with recording as described under "To Record from Microphone." The receiver volume and tone controls have no effect on the recording.

### To Record from Phonograph

1. If a phone-type plug is used on pickup leads, insert plug into Radio jack, set recording level, and proceed as described under "To Record from microphone."
2. If the more common pin-type plug is used, an adaptor is needed. Insert pin plug into adaptor and plug adaptor into Radio jack.



## Dual-Track Recording

1. After a reel of tape has been recorded, turn Tape Drive control to Idle.
2. Remove reels from recorder. Turn over full reel and place on right reel plate; place empty reel on left reel plate.
3. Properly thread tape and proceed with recording.
4. After this track has been recorded, first track can be played without rewinding by reversing reel as described in Step 2.

## To Play A Recording

1. Thread tape as described under "Threading Tape."
2. Without pressing Record-Edit button, turn Tape Drive control clockwise.
3. Adjust Loudness and Tone controls for desired listening level.

## To Use an External Speaker

Frequency response can be improved by using a larger speaker than the one in the recorder. To play recorder with an external speaker, use the speaker cable supplied as outlined in the following:

1. Connect cable to external speaker with alligator clips.
2. Plug speaker into external speaker jack. Recorder will now play through the external speaker.

**CAUTION:** Do not plug cable into Output jack unless external speaker is attached to plug, because output tube, transformer, and Tone control may be damaged.

## To Edit and Splice Tape

**NOTE:** It is impossible to edit and splice one track without affecting the other track. Therefore, recordings to be edited should be limited to one track only.

1. Tape may be edited by cutting out unwanted portions or by joining selections into another sequence. Announcements may be inserted between selections. Unused sections can be spliced for re-use.
2. For best results, cut tape at a slight diagonal. Join ends on glossy side with splicing tape and trim off excess width.

## Erasing Recorded Material

Any recording is automatically erased before a new one is put on the tape. To erase a recording without putting anything on tape, follow normal recording procedure, but leave Loudness control set at its extreme counterclockwise position.

## To Use as a Public Address System

1. Insert microphone plug into Radio jack.
2. Leave Tape drive control on Idle.
3. Speak into microphone and adjust Loudness and Tone controls for desired level.
4. To avoid feedback howl, do not place microphone too close to speaker.

## DISASSEMBLY

### To Remove Unit from Case

1. Remove eight wood screws (11) from control panel escutcheon plate.
2. Remove all control knobs and reel plate assemblies.
3. Remove hex nuts and washers from controls.
4. Remove screws (6) and (7).
5. Remove top cover assembly (15).
6. Remove top cover baffle (19).
7. Remove spacers (18).
8. Remove four screws from bottom of case.
9. Disconnect speakers.
10. Lift unit from case.

### To Remove Amplifier from Tape Transport Mechanism

1. Disconnect head and motor leads.
2. Remove bottom cover by removing 5 snaps.
3. Remove screw at front center of chassis holding tape transport mechanism to chassis.
4. Remove screws holding chassis to brackets.
5. Lift chassis from tape transport mechanism.

To reassembly, reverse the foregoing procedure.

## ADJUSTMENTS

### Spindle End Play Adjustments

Spindles (32) should have 1/32" to 1/16" up and down movement. To obtain correct amount of end play, loosen set screw in pulleys (103) and (120) and move pulleys up or down.

### Brake Adjustment

1. Bend tap A (see Exploded View) on take-up reel arm (77) and tab B (see Exploded View) on take-up lever (86) joined by take-up spring (85) until tabs are perpendicular to plate.
2. Plug line cord into outlet, turn on motor and amplifier switches, place Tape Drive control in Idle and Fast Forward-Rewind control in Neutral.



3. Place full reel of tape on take-up spindle but do not thread. Turn Fast Forward-Rewind control to Rewind position. Adjust tab C (see Exploded View) until take-up spindle rotates. Readjust until it stops.
4. Place full reel of tape on feed spindle but do not thread tape. Turn Fast Forward-Rewind control to Fast Forward position. Adjust tab D (see Exploded View) until feed spindle rotates. Readjust until it stops.
5. Since there may be interaction between these adjustments, Steps 3 and 4 may have to be repeated.

### Take-up Tension Adjustment

If take-up tension is not properly adjusted, flutter will occur. This is particularly noticeable at 3 3/4 ips and during initial winding of tape on take-up reel. Do not adjust if flutter occurs during first few feet of tape take-up. This is normal, and recording should not be made during this time.

1. Place a full reel of prerecorded tape on feed spindle (right), thread tape as for playback, and wind about 5 feet of tape onto take-up reel. Use small (5") reels and tape recorded at 3 3/4 ips.

NOTE: Footage indicator belt must be on pulleys.

2. Check take-up reel action by slowly turning Record-Play control to Play. Take-up reel should start revolving at same time pressure roller (33) engages with capstan shaft F. If adjustment is correct, there should be no tape overrun before it starts to take up, or no flutter in the sound. If adjustment is required, proceed with Steps 3 and 4.
3. Bend tab B on take-up lever (86) to right or left until proper take-up action with no overrun or flutter is obtained and tape from feed reel to heads shows no evidence of vibrating.
4. Slight additional adjustment may be obtained by bending tab A on take-up reel arm (77) and tab G on take-up lever (86).

### Play-Record Head Adjustment

If play-record head (31) is not perfectly aligned with tape, low output, loss of high frequencies, or track overlap may result.

#### To Align Play-Record Head (31)

1. First, adjust for output and frequency response. This adjustment must be made with a 3,000-cycle tape, recorded by a unit in good operating condition. Connect an output meter across speaker voice coil of unit to be adjusted. While playing back the 3,000-cycle note tape, move head back and forth on mounting until maximum deflection on output meter is achieved. If a 3,000-cycle note tape is not available, use a recording with a high note content and adjust as described in the foregoing.

### Erase Head Adjustment

Erase head (29) and head mounting bracket assembly (25) have been prealigned at the factory, and no adjustments are provided. To replace erase head (29), play-record head (31) must be removed. After erase head is installed, play-record head (31) must be realigned. (See "Play-Record Head Adjustment.")

### CLEANING

Record and erase heads, capstan shaft F (see Exploded View) and pressure roller (33) accumulate tape coating residue, worn off the tape as it passes these parts. This can cause distortion, weak output, and poor erasure. Use a soft cloth and alcohol to clean head surfaces, capstan, and pressure roller.

### LUBRICATION

Approximately once a year, or when parts are replaced, lubricate as follows:

With No. 20 motor oil:

1. Take-up reel arm (77) bushing.
2. Feed reel arm (109) bushing.
3. Bearings of spindles (32).
4. Flywheel (98) bearings.

With "Staput" No. 312 grease, "Lubriplate" or equivalent.

1. Pressure plate (43) at slide button, and guide on right side.
2. Stud of cam and bushing assembly (63).

**CAUTION:** Do not oil motor bearings unless absolutely necessary. Excess oil will be thrown off, causing slippage of pulley and rollers. When necessary to oil bearings, use as little oil as possible. Wipe any oil from pulleys and rollers with a petroleum solvent such as alcohol. Do not use carbon tetrachloride.

### AMPLIFIER ADJUSTMENT

The following adjustments should be made whenever circuit components are replaced or repaired.

These adjustments must be made with set turned on and in Record position with no signal input.

1. Adjust oscillator coil (L2) for 52.5-kc reading on frequency meter.
2. Adjust meter (R3) until needle rests directly over black dot at left side of meter. With meter (R3) properly adjusted, needle should move slightly when set is turned on and off.
3. To adjust 52.5-kc trap (L1), volume must be set at maximum. Adjust trap (L1) for minimum 52.5-kc reading at external amplifier jack.
4. Set hum adjust (R4) for minimum reading across load at external speaker jack with volume and treble set at maximum.



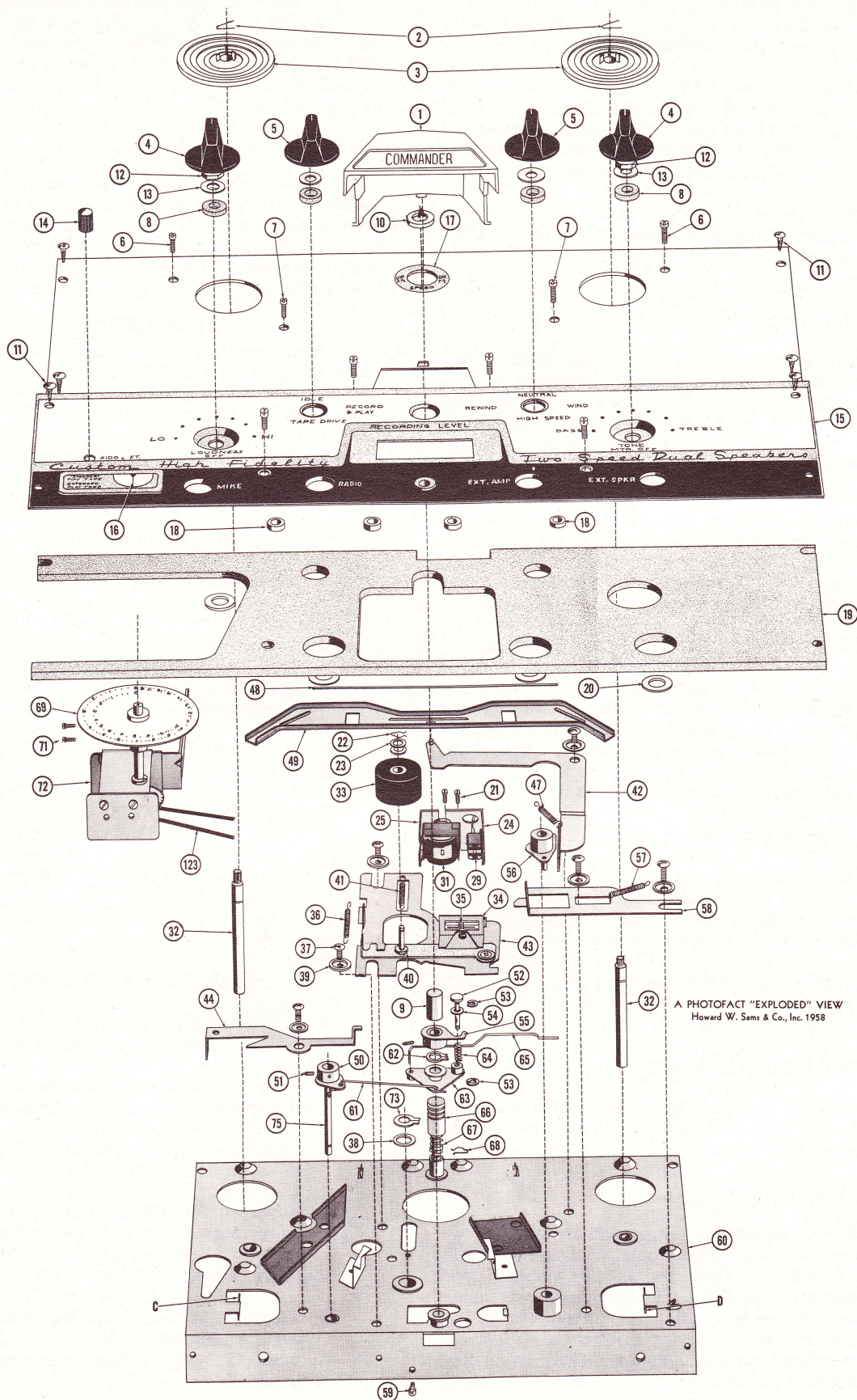
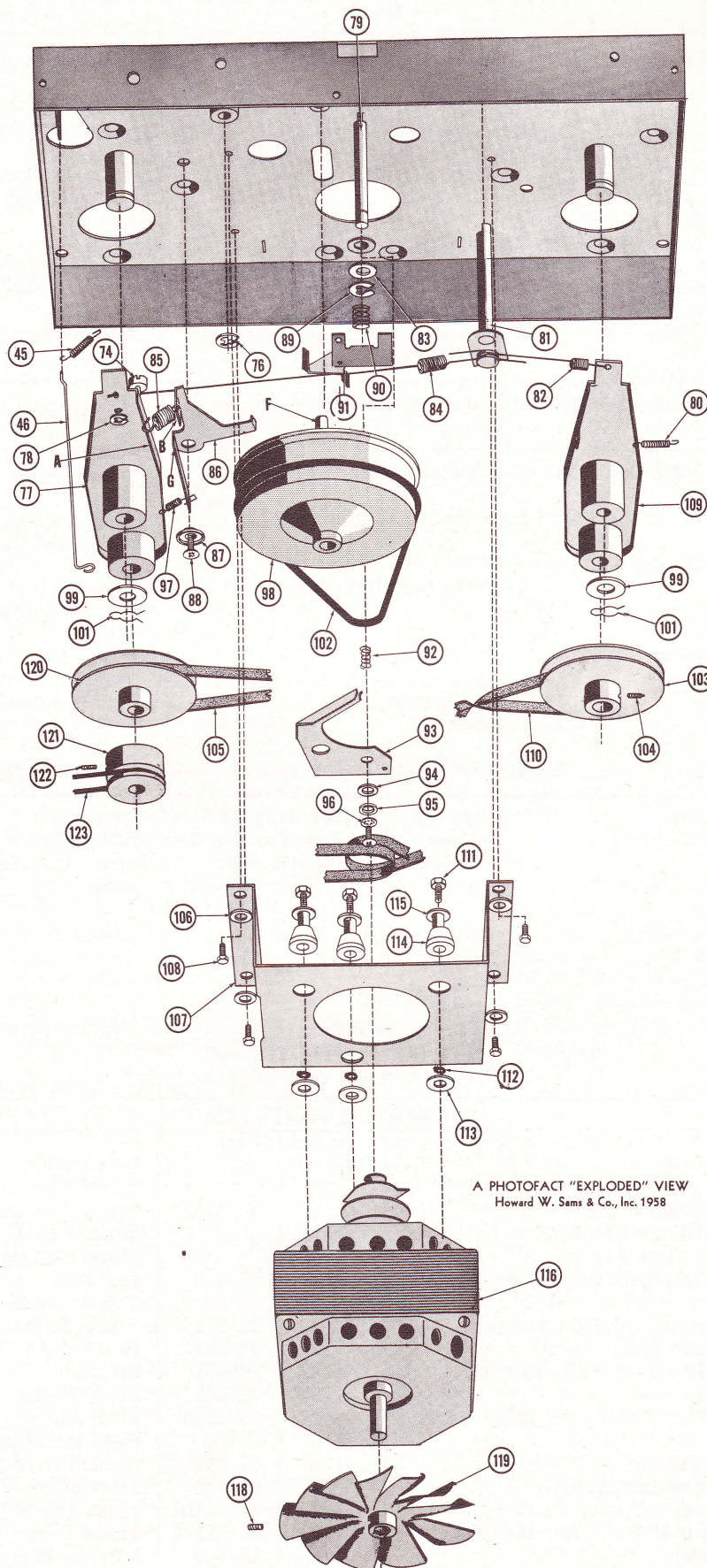


FIG. 3A EXPLODED VIEW OF PARTS ABOVE BASEPLATE





A PHOTOFACT "EXPLODED" VIEW  
Howard W. Sams & Co., Inc. 1958

FIG. 3B EXPLODED VIEW OF PARTS BELOW BASEPLATE



# TROUBLE CHART

Symptom	Cause	Remedy
Will not take up tape properly.	1. Spindle (32) binding.	1. Lubricate.
	2. Drive belt (110) slipping.	2. Clean motor pulley, and take-up pulley and flange (103).
	3. Drive belt (110) broken.	3. Remove motor and lug assembly bracket (107) and replace drive belt (110).
	4. Set screw is loose in take-up pulley and flange (103).	4. Tighten leaving 1/32" to 1/16" end play in spindle.
	5. Take-up pulley and flange (103) broken.	5. Replace take-up pulley and flange (103).
Fast forward will not function properly.	1. See previous cause, except Step 2.	1. See previous remedy, except Step 2.
Fast rewind will not function properly.	1. Spindles (32) binding.	1. Lubricate.
	2. Drive belt (110) slipping.	2. Clean motor pulley, and take-up pulley and flange (103).
	3. Drive belt (110) broken.	3. Remove motor and lug assembly bracket (107) and replace drive belt (110).
	4. Set screw is loose in rewind pulley (120).	4. Tighten, leaving 1/32" to 1/16" end play in spindle.
	5. Rewind pulley (120) broken.	5. Replace pulley (120).
Speed variation or wow.	1. Dirty motor pulley, flywheel and shaft (98), and pressure roller (33), causing slippage.	1. Clean with a petroleum solvent, not carbon tetrachloride. If pressure roller (33) is oil-soaked, replace.
	2. Feed reel out of adjustment, causing too much feed reel drag.	2. Check adjustments as described under "Take-up Tension Adjustment."
	3. Flat spot on pressure roller (33), causing a rapid thumping sound while unit is running.	3. Replace pressure roller (33).

## MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	21-264-0	Tape Head Cover
2	22-110-0	Reel Plate Retainer
3	84-3437	Reel Plate Ass'y.
4	52-1051-0	Off-On, Loudness, Tone-Motor Knob
5	52-1050-0	Play-Record, Fast Forward-Rewind Knob
6	57-606611	#6-32 x 3/8" Phil. Rd. Hd. Mach. Screw
7	97-600	#6-32 x 3/16" Phil. Rd. Hd. Mach. Screw
8	86-307	Flatwasher
9	52-833-0	Record-Edit Button
10	86-270	Rubber Washer
11	97-599	#6 x 1/2" Phil. Rd. Hd. Wood Screw
12	56-230	#3/8-32 Hex Nut
13	86-308	Flatwasher
14	52-802-0	Indicator Footage Knob

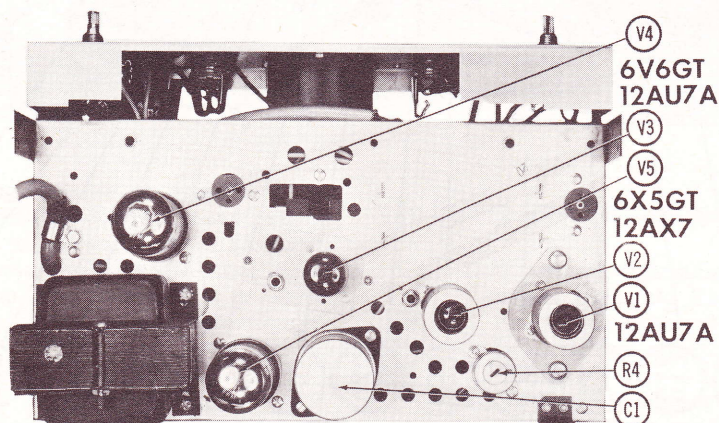
Ref. No.	Part No.	Description
15	84-4743	Top Cover Ass'y.
16		Window Dial
17		Speed Control Indicator Escutcheon
18	77-9-0	Spacer
19	44-20-0	Top Cover Baffle
20	86-265	Fibre Washer
21	97-569	#6-32 x 1/4" Phil. Bd. Hd. Screw
22	22-40-1	Retainer
23	86-282	Cloth Washer
24	84-4640	Head Ass'y.
25	11-1115	Head Mounting Bracket
26	84-3423	Ground Wire & Lug
27	86-295	Flatwasher
28	57-203111	#2-56 x 3/16" Screw
29	33-273-0	Erase Head
30	45-4-0	3 Prong Plug
31	84-4739	Play-Record Head
32	84-3404	Spindle Ass'y.
33	39-1-5	Pressure Roller Ass'y.



# MECHANICAL PARTS LIST-CON'T

Ref. No.	Part No.	Description
34	84-3401	Pressure Shoe Ass'y.
35	70-253-0	Pressure Shoe Spring
36	70-258-0	Pressure Roller Spring
37	97-573	#6-32 x 1/4" Phil. Fl. Hd. Screw
38	86-372	Capstan Washer
39	72-135	Slide Button
40	84-3408	Pressure Roller Arm Ass'y.
41	70-251-0	Slide Return Spring
42	84-3455	Brake Lever & Pin Ass'y
43	84-3458	Pressure Plate & Spring Ass'y.
44	22-15-4	Foot Switch Lever
45	70-244-0	Foot Switch Return Spring
46	39-5-3	Foot Switch Linkage Wire
47	70-251-0	Return Spring
48	70-264-0	Brake Plate Spring
49	29-114-1	Brake Plate
50	84-3439	Motion Cam Ass'y.
51	97-577	#6-32 x 3/8" Slab Hd. "Cone Pt." Set Screw
52	72-134	Plunger
53	22-44-1	Retainer
54	86-302	Flatwasher
55	84-3443	Catch Ass'y.
56	84-3442	Hub Ass'y.
57	70-267-0	Return Spring
58	22-16-4	Interlock Lever
59	97-569	#6-32 x 1/4" Phil. Bd. Hd. Screw
60	84-3461	Motorboard Ass'y.
61	22-20-4	Drive Link Wire
62	22-52-1	Retainer
63	84-3728	Cam & Bushing Ass'y.
64	70-263-0	Plunger Spring
65		Take-up Brake Rod (Part of Ref. 63)
66	84-3405	Plunger Knob & Shaft Ass'y.
67	70-259-0	Compression Spring
68	70-256-0	Plunger Detent Spring
69	84-3396	Dial Ass'y.
70	62-81-0	"O" Ring
71	97-566	#6-32 x 1/4" Hex Hd. Screw, Special
72	39-1-2	Indicator
73	22-37-1	Retainer
74	39-1-0	Foot Switch Adjustment Cam
75	39-6-3	Motion Shaft (Left)
76	22-38-1	Retainer
77	84-3452	Take-up Reel Arm Ass'y.
78	22-46-1	Spring Washer

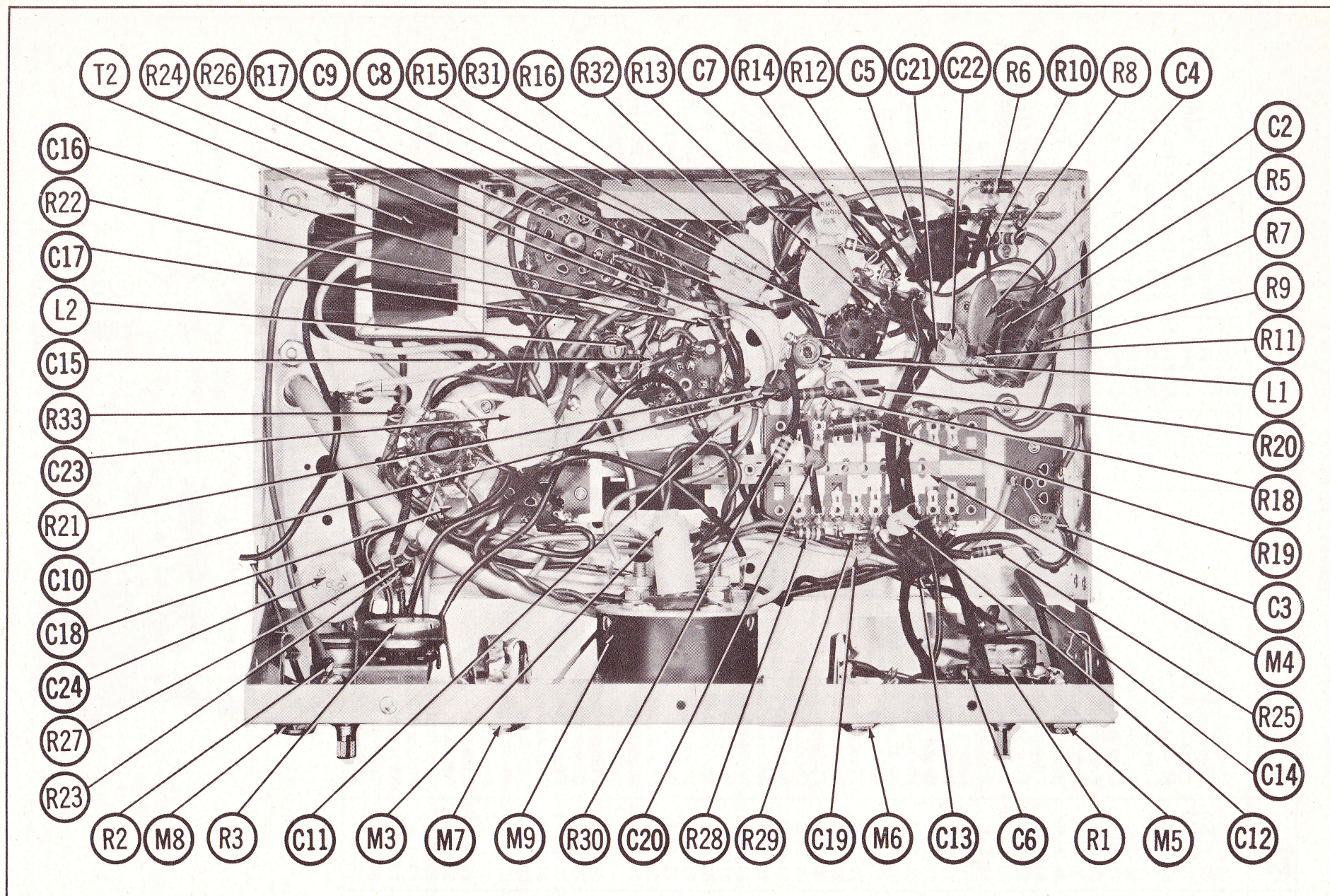
Ref. No.	Part No.	Description
79	39-9-3	Control Shaft
80	70-252-0	Brake Spring (Right)
81	84-3446	Cam & Stud Ass'y. Shaft
82	70-324-0	Tape Tension Spring (Right)
83	86-288	Rubber Washer
84	70-325-0	Tape Tension Spring (Left)
85	70-250-0	Take-up Spring
86	22-13-4	Take-up Lever
87	72-135	Slide Button
88	97-573	#6-32 x 1/4" Phil. Fl. Hd. Screw
89	22-45-1	Retainer
90	70-265-0	Control Shaft Return Spring
91	84-3465	Edit Lever Ass'y. Bracket
92	70-259-0	Compression Spring
93	22-14-4	Belt Transfer Fork
94	86-284	Flatwasher
95	86-284	Flatwasher
96	86-45	#6 Int. Tooth Lockwasher
97	70-257-0	Brake Spring (Left).
98	84-3466	Flywheel & Shaft Ass'y.
99	86-290	Flatwasher
100	86-290	Flatwasher
101	22-42-1	Hairpin Retainer
102	62-79-0	Flywheel Belt
103	84-3406	Take-up Pulley & Flange Ass'y.
104	97-577	#6-32 x 3/8" Slab Hd. Set Screw
105	62-78-0	Drive Belt
106	86-294	Flatwasher
107	84-3407	Motor & Lug Ass'y. Bracket
108	97-567	#8-32 x 3/16" Hex Hd. Screw
109	84-3450	Feed Reel Arm Ass'y.
110	62-78-0	Drive Belt
111	97-574	#8-32 x 5/8" Hex Hd. Screw
112	86-293	#8 Int. Tooth Lockwasher
113	86-292	Flatwasher
114	62-74-0	Rubber Grommet
115	62-123	Eyelet
116	84-3457	Motor, Plug & Pulley Ass'y.
117	45-4-0	3 Prong Plug
118	97-619	#8 x 3/16" Cup Pt. "Allen Hd." Set Screw
119	84-4240	Fan, Hub & Set Screw Ass'y.
120	84-3431	Rewind Pulley & Flange Ass'y.
121	39-4-1	Footage Meter Pulley
122	97-572	#6-32 x 1/2" Slab Hd. "Cone Pt." Set Screw
123	62-80-0	Drive Belt



TOWER  
MODEL 4691

FOLDER 8





AMP CHASSIS - BOTTOM VIEW







## PARTS LIST AND DESCRIPTIONS

### TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamplifier	12AU7A	
V2	AF Amplifier	12AX7	
V3	Meter Amp. - Bias Osc.	12AU7A	

ITEM No.	USE	TYPE	NOTES
V4	Output	6V6GT	
V5	Rectifier	6X5GT	

### ELECTROLYTIC CAPACITORS

ITEM No.	RATING		TOWER PART No.	REPLACEMENT DATA						NOTES
	CAP.	VOLT.		AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	
C1A	40	350	18-36-3		D0032	FP420.35	TMQ-12	D-167		R2478 *
B	40	300			BR3035	TC77	TMS-37	MT-4540		
C	40	300								
C2	25	25	18-52-5	PRS25V25	BBR25-25	TC-26	TD-25-25	MT-0225		TVA-1205

\* Non-Catalog Item

### FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		TOWER PART No.	AEROVOX PART No.	REPLACEMENT DATA				NOTES
	CAP.	VOLT.			CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	20		15-20011	N750-DI20	DTN-20	C10Q2U		5TCU-Q2	N750
C4	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-82	
C5	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-82	
C6	75		15-75011	N750-DI75	DTN-75	C10Q75U		5TCU-Q75	N750
C7	1500		15-15211			1RS5D15		MS-215	10%
C8	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-82	
C9	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-82	
C10	470		15-47111		D6-471	5R5T47		MS-347	10%
C11	1500		15-15211			1RS5D15		MS-215	10%
C12	2000	1000	15-20226		DD-202	BYA10D2		5GA-D2	
C13	75		15-75011	NP0-DI75	DTZ-75	C10Q75C		5TCC-Q75	10%
C14	10000		15-10316	BPD-01	DD-103	BYA6S1		5HK-S1	
C15	1000	1000	15-10226	HVD-15-1000	DD-102	BYA10D1	DC3021	5GA-D1	
C16	470		15-47111			5R5T47		MS-347	10%
C17	1500		15-15211	1464-0015		1RS5D15		MS-215	10%
C18	1000	1000	15-10226	HVD-15-1000	DD-102	BYA10D1	DC3021	5GA-D1	
C19	470		15-47111		D6-471	5R5T47		MS-347	10%
C20	470		15-47111		D6-471	5R5T47		MS-347	10%
C21	10		15-10011	N750-DI10	DTN-10	C10Q1U	NT-541	5TCU-Q1	N750
C22	10		15-10011	N750-DI10	DTN-10	C10Q1U	NT-541	5TCU-Q1	N750
C23	10000	1500	20-75-0	DAC-27	DD16-103	HVE16S1		BL-S10	
C24	10000	1500	20-75-0	DAC-27	DD16-103	HVE16S1		BL-S10	

### CONTROLS

ITEM No.	RATING		TOWER PART No.	CENTRALAB PART No.	REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS			CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	1/2	24-271-0	BT-66	A47F3-500K	Q13-133X	UT-427	Loudness, Tap@100K
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	Q-13-133X	US-26	Power On-Off
R2A	500K	1/2	24-143-0	B-60	A47-500K-Z	Not Req.	U48	Tone Note 1.
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Motor On-Off
R3	50K	1/2	24-3-3	BX-31				Meter Adj.
R4	200Ω	2(WW)	24-1-3					Hum Balance

\* Use KR with CRL "Red Label" controls and KB with "Blue Label" controls.  
Note 1. Part #24-143-2 may be used in some versions.

### RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TOWER PART No.	NOTES
	OHMS	WATT		
R5	1meg		60-10501	
R6	220K		60-22401	
R7	4700Ω		60-47201	
R8	470K		60-47401	
R9	470K		60-47401	

ITEM No.	RATING		TOWER PART No.	NOTES
	OHMS	WATT		
R10	220K		60-22401	
R11	4700Ω		60-47201	
R12	100K		60-10401	
R13	1500Ω		60-15201	
R14	150K		60-15401	

## PARTS LIST AND DESCRIPTIONS (Continued)

### RESISTORS (cont)

ITEM No.	RATING		TOWER PART No.	NOTES
	OHMS	WATT		
R15	220K		60-22401	
R16	220K		60-22401	
R17	2200Ω		60-22201	
R18	68K		60-68302	
R19	560Ω	1	60-56111	
R20	270Ω	1	60-27111	
R21	1meg		60-10501	
R22	1meg		60-10501	
R23	62K 5%		60-62305	
R24	100K 5%		60-10405	

ITEM No.	RATING		TOWER PART No.	NOTES
	OHMS	WATT		
R25	56K		60-56301	
R26	47K		60-47301	
R27	10K		60-10302	
R28	470K		60-47401	
R29	220K		60-22401	
R30	470K		60-47401	
R31	1000Ω	10WW	61-106	
R32	15K		60-15302	
R33	3.9Ω		60-39901	

### COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		TOWER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	52.5KC Trap	10-9-5					
L2	Bias Osc.	10-33-4					

### TRANSFORMER (POWER)

ITEM No.	RATING			TOWER PART No.	REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2		Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .38A	560VCT @ .060A	6.3V @ 2A	80-3-0		P-3048 ①			22R01 ①	R-5B ①

① Use original shields.

### TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		TOWER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
	PRI.	SEC.								
T2	5000Ω	3-4Ω Tap @ 1-2Ω	80-3-16	Z1001	A-2902 ①	AU-608	A-3850	24S64 ①	S-51X	① Drill new mounting hole.

### SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TOWER PART No.	QUAM PART No.	
SP1	6 1/2"	PM	3-4Ω	33-309-4	6A21	
SP2	6 1/2"	PM	3-4Ω	33-309-4	6A21	

### MISCELLANEOUS

ITEM No.	PART NAME	TOWER PART No.	NOTES
M1	Erase Head	33-273-0	(#8015A)
M2	Record-Play Head	84-4739	Includes Adaptor
M3	Lamp	89-7	Meter Light, #47
M4	Switch	69-241-0	Record-Play, Slide Type
M5	Jack	45-2-1	Mike, Shorting Type
M6	Jack	45-2-1	Radio-Phono, Shorting Type
M7	Jack	45-2-1	External Speaker, Shorting Type
M8	Jack	45-1-1	External Amplifier, 2 Circuit Type
M9	Meter	83-1115	
M10	Motor	84-3457	Includes Plug and Pulley Ass'y.
	Microphone	33-39-1	

### CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

### WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors
Power Cord	8524 (Stranded) Available in Ten Colors
	Use BELDEN No. 1765-B (6 Ft. Length)
	1725-K (7 1/2 Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)